UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/822,923	03/30/2001	Matthew E. Frazer	PW 027 3217 P10862	8276

27496 7590 02/03/2004

PILLSBURY WINTHROP LLP
725 S. FIGUEROA STREET
SUITE 2800
LOS ANGELES, CA 90017

EXAMINER	
WANG, JIN CHENG	

ART UNIT	PAPER NUMBER
2672	9

DATE MAILED: 02/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/822,923	Applicant(s) FRAZER ET AL.
	Examiner Jin-Cheng Wang	Art Unit 2672

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 January 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-11,13-18,21,24,27 and 28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-11, 13-18, 21, 24, 27-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

The amendments filed on 01/12/2004 have been entered. Claims 1, 9 and 16 have been amended. Claims 2, 12, 19-20, 22-23, and 25-26 have been canceled. Claims 1, 3-11, 13-18, 21, 24, 27-28 are pending in the application.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3-11, 13-18, 21, 24, 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradski et al. U.S. Pat. No. 6,363,160 (hereinafter Bradski) in view of Zabih et al. U.S. Patent No. 6,181,817 (hereinafter Zabih), Kenet et al. U.S. Patent No. 5,016,173 (hereinafter Kenet) and Darrell et al. U.S. Patent No. 6,188,777 (hereinafter Darrell).

3. Claim 1:

(1) Bradski teaches an automated calibration system (figure 1; column 3, lines 34-55) to track a selected object through a series of frames of data (column 7, lines 55-65), comprising:

A display device (e.g., figure 11) to display at least one image frame received from an image input device, wherein the image frame includes a calibration rectangle (column 4, lines 2-60; column 15, lines 13-58; figures 4, 10A and 10B);

An image selection device to select, via the calibration rectangle, the selected object in the at least one image frame (column 3, lines 59-67, column 4, lines 1-10, and column 7, lines 33-54; column 15, lines 13-58);

An image source device (video source 1102 of figure 11) to provide a hue saturation value (HSV) data array of pixels forming the at least one image frame (column 4, lines 2-57; column 13, lines 45-52; column 15, lines 13-58; figures 3A and 3B); and

A processing device (figures 1-9; column 13, lines 55-67; column 14, lines 1-59) to determine analysis data for pixels (column 4, lines 2-57; figures 4, 3A and 3B) within the calibration rectangle (column 5, lines 52-67; column 6, lines 1-44; column 15, lines 13-58; figures 4, 10A and 10B), based on the HSV data array (column 4, lines 2-57; figures 3A and 3B), and determine test analysis data (e.g., window sizing parameters) for a set of adjacent test windows (e.g., search windows or boxes or windows of FIG. 14A displaying images; column 5, lines 52-67; column 6, lines 1-44; column 15, lines 13-58), each of the adjacent test windows (e.g., the moving search windows) having a same shape and a same pixel size (e.g., column 7; column 14-15) as the calibration rectangle (e.g., the entire video frame or a calculation region in a form of rectangle or a search window; column 7, lines 5-55; column 15, lines 13-58), wherein tracking data, to track the selected object (e.g., the selected gestures), is selected from one of the calibration rectangle (e.g., the calculation region in a form of rectangle) and the adjacent test windows (e.g., the search windows) having a highest tracking probability (i.e., the tracking data such as window location parameters are determined/adjusted and a search window having the largest connected region of a probability distribution and the greatest probability density is selected, column 6, lines 45-67; column 7, lines 55-67; column 8, lines 1-9; column 15, lines 13-

58) and each of the adjacent test windows share at least one pixel with the calibration rectangle (e.g., column 7, lines 5-55; column 15, lines 13-58).

(2) However, Bradski is silent on the claim limitation of "lowest sum of a hue standard deviation and a saturation standard deviation".

(3) Darrell in view of Zabih and Kenet teaches selecting an object based on the "lowest sum of a hue standard deviation and a saturation standard deviation." (e.g., Darrell column 10, lines 44-65; Zabih column 2, lines 20-37; Kenet column 20, lines 10-30; Kenet column 16, lines 1-20). Darrell teaches selecting a tracking object based on the optimum ranges and the highest probability density of a search region by collecting the variance data of joint probability distributions for the observed color data while Zabih teaches selecting a best match result (with the optimum ranges and the highest probability density) for an object based on the color joint histograms of the candidate images and based on the calculation of the standard deviations (variance) for each color in HSV color space while Kenet teaches finding a search region based on the optimum ranges/criteria by optimization and joint histograms.

(4) It would have been obvious to one of ordinary skill in the art to have incorporated the Darell/Zabih/Kenet's selection means with the optimum ranges/criteria into the Bradski's invention to select a tracking object based on the lowest sum of a hue standard deviation and a saturation standard deviation. Bradski teaches performing pattern recognition based on Gaussian and Chi-square distributions to determine a best match for the tracked object and therefore suggests selecting a tracking object based on the lowest sum of a hue standard deviation and a saturation standard deviation because such a selection of optimum ranges yields the best match tracking object.

(5) One having the ordinary skill in the art would have been motivated to do this because it would have provided a routine experimentation of the optimum ranges and criteria for object selection to find the best match tracking object.

Claim 3:

The claim 3 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of a digital camera. However, Bradski further discloses the claimed limitation of the digital camera (Bradski column 4, lines 1-57).

Claim 4:

The claim 4 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of a single device. However, Bradski further discloses the claimed limitation of the single device (figure 1).

Claim 5:

The claim 5 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of the processing device calculating a mean hue and a standard deviation of a hue of the pixels representing the selected object. However, Bradski further discloses the claimed limitation of the processing device (figures 1- 9) calculating a mean hue and a standard deviation of a hue of the pixels representing the selected object (figures 3A, 3B and 4; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 22-44; column 12, lines 1-67).

Claim 6:

The claim 6 encompasses the same scope of invention as that of claim 5 except additional claimed limitation of the selected object not being tracked if the mean hue or the standard deviation of the hue is less than predetermined levels. However, Bradski further discloses the claimed limitation of the selected object not being tracked if the mean hue or the standard deviation of the hue is less than predetermined levels (It is apparent that a Gaussian or Chi-Square hue probability distribution of Bradski involves the mean hue or the standard deviation of the hue and search for the area with the greatest probability density involves the motion-tracking processing of not tracking a region where the mean hue or the standard deviation of the hue being less than predetermined levels; figures 3A, 3B and 4; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 1-63, and column 6, lines 22-44; column 8, lines 10-38; column 12, lines 1-67).

Claim 7:

The claim 7 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of the analysis module calculating a mean saturation and a standard deviation of a saturation of the pixels representing the selected object. However, Bradski further discloses the claimed limitation of the processing device (e.g., figures 1-9) calculating a mean saturation and a standard deviation of a saturation of the pixels (e.g., a mean saturation and a standard deviation of a saturation of the pixels is an inherent property of a Gaussian or Chi-Square probability density) representing the selected object (figures 3A, 3B and 4; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 22-44; column 8, lines 10-38; column 12, lines 1-67).

Claim 8:

The claim 8 encompasses the same scope of invention as that of claim 7 except additional claimed limitation of the colored object not being tracked if the mean saturation or the standard deviation of the saturation is less than predetermined level. However, Bradski further discloses the claimed limitation of the selected object not being tracked if the mean saturation or the standard deviation of the saturation is less than predetermined level (figures 3A, 3B and 4; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 1-63, and column 6, lines 22-44; column 8, lines 10-38; column 10, lines 35-67; column 12, lines 1-67).

4. Claim 9:

The claim 9 encompasses the same scope of invention as that of claim 1 in a method form. The claim is rejected for the same reason as set forth in claim 1.

Claim 10:

The claim 10 encompasses the same scope of invention as that of claim 9 except additional claimed limitation of converting a pixel data array for the at least one image frame from a red-green-blue color space (RGB) data array to the HSV data array. However, Bradski further discloses the claimed limitation of converting a pixel data array for the at least one image frame from a red-green-blue color space (RGB) data array to the HSV data array (column 4, lines 1-57).

Claim 11:

The claim 11 encompasses the same scope of invention as that of claim 28 except additional claimed limitation of applying the pixel data from an entire frame to the pixel-classification look-up map wherein if the amount of the pixels associated with the selected object

is greater than a predetermined amount, the calibration method restarts. However, Bradski further discloses the claimed limitation of applying the pixel data from an entire frame to the pixel-classification look-up map (column 4, lines 45-60) wherein if the amount of the pixels associated with the selected object is greater than a predetermined amount, the calibration method restarts (figures 3A, 3B and 4; column 4, lines 1-61; column 6, lines 5-57; column 10, lines 35-67).

Claim 13:

The claim 13 encompasses the same scope of invention as that of claim 10 except additional claimed limitation of thresholding the HSV data array of pixels and disregarding pixel data for each of the pixels having a product of a saturation coordinate and a value coordinate below a predetermined threshold amount. However, Bradski further discloses the claimed limitation of thresholding the HSV data array of pixels and disregarding pixel data for each of the pixels having a product of a saturation coordinate and a value coordinate below a predetermined threshold amount (From the Bradski's teaching that "Hue values are only accumulated if their corresponding S and V values are above respective S and V thresholds"..., it can be seen that pixel data with the product of S and V values less than a threshold would be excluded from accumulation to the Hue values. See figures 3A, 3B and 4; column 4, lines 1-57; column 5, lines 1-61; column 10, lines 35-67; column 13, lines 55-67; column 14, lines 1-59).

Claim 14:

The claim 14 encompasses the same scope of invention as that of claim 10 except additional claimed limitation of calculating a mean hue and a standard deviation of a hue of the

pixels in the selected object. However, Bradski further discloses the claimed limitation of calculating a mean hue and a standard deviation of a hue of the pixels (The mean hue and standard deviation of a hue values are inherently associated with hue probability density) in the selected object (column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 22-44; column 8, lines 10-38; column 10, lines 35-67; column 12, lines 1-67).

Claim 15:

The claim 15 encompasses the same scope of invention as that of claim 14 except additional claimed limitation of restarting the calibration method if the mean hue or the standard deviation of the hue is less than predetermined level. However, Bradski further discloses the claimed limitation of restarting the calibration method (restarting searching) if the mean hue or the standard deviation of the hue is less than predetermined level (figures 3A, 3B and 4; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 1-44; column 8, lines 10-38; column 10, lines 35-67; column 12, lines 1-67).

Claim 16:

The claim 16 encompasses the same scope of invention as that of claim 10 except additional claimed limitation of calculating a mean saturation and a standard deviation of a saturation of the pixels in the selected object. However, Bradski further discloses the claimed limitation of calculating a mean saturation and a standard deviation of a saturation of the pixels in the selected object (figures 3A, 3B and 4; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 22-44; column 12, lines 1-67).

Claim 17:

The claim 17 encompasses the same scope of invention as that of claim 16 except additional claimed limitation of restarting the calibration method if one of the mean saturation and the standard deviation of the saturation is less than predetermined level. However, Bradski further discloses the claimed limitation of restarting the calibration method if one of the mean saturation and the standard deviation of the saturation is less than predetermined level (figures 3A and 3B; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 22-44; column 12, lines 1-67).

Claim 18:

The claim 18 encompasses the same scope of invention as that of claim 10 except additional claimed limitation of allowing the user to select the selected object. However, Bradski further discloses the claimed limitation of allowing the user to select the selected object (column 4, lines 1-57; column 15, lines 1-67).

Claim 21:

The claim 21 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of a thresholding module to disregard pixel data for each of the pixels having a product of a saturation coordinate and a value coordinate below a predetermined threshold amount. However, Bradski further discloses the claimed limitation of a thresholding module to disregard pixel data for each of the pixels having a product of a saturation coordinate and a value coordinate below a predetermined threshold amount (figures 3A, 3B, 4-5; column 4, lines 1-57; column 13, lines 55-67; column 14, lines 1-59).

Claim 24:

The claim 24 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of each of the adjacent test windows having at least one pixel overlapping with the calibration rectangle. However, Bradski further discloses the claimed limitation of each of the adjacent test windows having at least one pixel overlapping with the calibration rectangle (figures 4, 10A-10B and 14A; column 6, lines 1-67; figures 11-14, column 15, lines 1-67).

Claim 27:

The claim 27 encompasses the same scope of invention as that of claim 9 except additional claimed limitation of each of the adjacent test windows having at least one pixel overlapping with the calibration rectangle. However, Bradski further discloses the claimed limitation of each of the adjacent test windows (the moving search windows) having at least one pixel overlapping with the calibration rectangle (figures 4, 10A-10B; column 6, lines 1-67; figures 11-14, column 15, lines 1-67).

Claim 28:

The claim 28 encompasses the same scope of invention as that of claim 9 except additional claimed limitation of creating a pixel-classification look-up map for the HSV data array of pixels, and the pixel classification map classifies the pixels belonging to the selected object based on a hue and a saturation of the pixels. However, Bradski further discloses the claimed limitation of creating a pixel-classification look-up map for the HSV data array of pixels, and the pixel classification map classifies the pixels belonging to the selected object based on a hue and a saturation of the pixels (figures 4, 10A and 10B; column 4, lines 2-57; column 6, lines 5-35).

Remarks

5. Applicant's arguments, filed 01/12/2004, paper number 8, have been fully considered but they are not deemed to be persuasive.

6. In Remarks, Applicant argues in essence with respect to claim 1 and similar claims that:

On page 10, Applicant argues, "Bradski does not disclose, teach, or suggest use of adjacent test windows, each having a same shape and a same pixel size as the calibration window."

This is not found persuasive because as set forth in this Office Action, Bradski teaches determining test analysis data (e.g., window sizing parameters) for a set of adjacent test windows (e.g., search windows or boxes or windows of FIG. 14A displaying images; column 5, lines 52-67; column 6, lines 1-44; column 15, lines 13-58), each of the adjacent test windows (e.g., the moving search windows) having a same shape and a same pixel size (e.g., column 7; column 14-15) as the calibration rectangle (e.g., the entire video frame or a calculation region in a form of rectangle or a search window; column 7, lines 5-55; column 15, lines 13-58), wherein tracking data, to track the selected object (e.g., the selected gestures), is selected from one of the calibration rectangle (e.g., the calculation region in a form of rectangle) and the adjacent test windows (e.g., the search windows) having a highest tracking probability (i.e., the tracking data such as window location parameters are determined/adjusted and a search window having the largest connected region of a probability distribution and the greatest probability density is selected, column 6, lines 45-67; column 7, lines 55-67; column 8, lines 1-9; column 15, lines 13-

58) and each of the adjacent test windows share at least one pixel with the calibration rectangle (e.g., column 7, lines 5-55; column 15, lines 13-58).

Although the pixel size of the search windows (which meet the claim limitation of "adjacent test windows") is not shown the same as the pixel size of the calculation region (which meets the claim limitation of "calibration rectangle") in figures 10A, 13A-14E, Bradski teaches that the initial search window size and location can be selected to be the same size as the entire video frame and the calculation region for tracking is set to be the entire video frame (See column 7, lines 10-20). When the search window size and the calculation region size are both set to be the entire video frame, the pixel size of the search windows is the same as that of the calculation region. Bradski clearly meets the newly added claim limitation and the claim 1 as amended is obvious over Bradski/ Zabih/Kenet/Darrell.

7. In Remarks, Applicant argues in essence with respect to claim 1 and similar claims that:

On page 11, Applicant argues, "Therefore, applicants respectfully submit that such boxes are not adjacent test windows as recited in independent claim 1, as amended. Moreover, applicants submit that even assuming arguedo that those boxes were adjacent test windows, they do not have both the same size and shape as a calibration rectangle."

This is not found persuasive because Bradski's calculation region meets the claim limitation of "calibration rectangle". The calculation region can be the entire video frame having a shape of a rectangle and is used for tracking in video sequences. Therefore, the calculation region is clearly a calibration rectangle. Bradski's search windows meet the claim limitation of "adjacent test windows." The search windows of Bradski can be made

the same size as the entire video frame (window) wherein the test video frames are shown in *successive* frames (adjacent frames or adjacent windows) in video sequences (Figures 14A-14E) and the image within one of the boxes is selected. Furthermore, Applicant clearly has implicitly defined "adjacent test windows" in the amended claims. Therefore, the term "adjacent test window" is interpreted as the search windows of Bradski which are the test video frames or test video windows as shown in successive frames or windows and some are adjacent to each other in video sequences (See Figures 14A-14E).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jin-Cheng Wang whose telephone number is (703) 605-1213. The examiner can normally be reached on 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Razavi can be reached on (703) 305-4713. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-6606 for regular communications and (703) 308-6606 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 395-3900.

jcw
January 27, 2004

MICHAEL RAZAVI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600